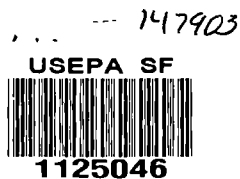


SF/AR  
6.9.2.1

**From:** PATRICIA MCGRATH  
**To:** RODENALI.VOYTILLA-MARYKAY  
**Date:** 5/17/99 10:10am  
**Subject:** bunker hill

Attached are comments on the Bunker Hill Treatability Study work plan. I was not sure whether or not you were pursuing this work (due to the budget problem that you mentioned in your voice mail message last week), but since it did not take much time, I went ahead and reviewed the work plan.

let me know if you have any questions





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

Reply To  
Attn Of: OW-130

May 17, 1999

**MEMORANDUM**

SUBJECT: Working Draft Bunker Hill Mine Water AMD Treatability Study Work Plan Review Comments

FROM: Patty McGrath, Office of Water  
Environmental Engineer

TO: Mary Kay Voytilla, Office of Environmental Cleanup  
Project Manager

Following are my comments on the above referenced document.

(1) General Comment: At several places in the document, CH2M Hill makes predications regarding the extent to which the various treatment technologies might meet the discharge limits. At this stage it is premature to rank these three technologies in such a manner (e.g., Section 1.1) or to state that the technology may meet some of the limits some of the time (e.g., Section 1.1.2). Rather it is preferable to just state that these technologies were selected for testing since they have the potential to achieve the treatment goals.

For example, it is premature to state that iron co-precipitation may be more effective for removal of lead and zinc while sulfide precipitation may be more effective for removal of cadmium (Section 1.1.2 and 1.1.3). The effectiveness of these precipitation technologies is discharge-specific, especially at the low level of the treatment goals. Likewise, the cost of the two technologies is similar (within the level of variability presented in the Bunker Hill Mine Water Presumptive Remedy memorandum) so that it is premature to state that sulfide precipitation may cost less.

(2) Section 1.2, Treatment Goals: two comments on this section  
- Delete the second sentence of this section. Agree that the numbers are lower than the current

treatment goals, but calling them "extremely stringent" is unnecessary. Also, Bunker Hill does not have a "current NPDES permit".

- Since the TMDL waste load allocations (WLAs) will be expressed in terms of mass, the title of Table 1-1 should be changed to express mass. Or, preferably, change the title to "Treatment Goals" and discuss how CH2M Hill translated the TMDL mass-based WLAs into concentration.

(3) Section 2: Two comments on the test objectives.

- second bullet: Since only one sulfide dosage is proposed for testing in Phase 1, establishing the preliminary chemical dose of sulfide should not be included as an objective of the testing.

- Consider adding the following objectives in Phase 2:

- evaluate the effectiveness of the selected technology(ies) on other parameters of concern (e.g., Cu, Ag, etc?)
- evaluate settling performance
- evaluate sludge characteristics (e.g., volume, density, etc. for disposal considerations)

(4) Sections 3.2.3 and 3.3.3, general comment on testing procedures: The testing procedures should allow for the use of flocculant to promote settling if necessary. Should also consider whether aeration is needed to promote the reactions.

(5) Section 3.2: Briefly explain why ferric sulfate (instead of other ferric sources) was selected for testing. The best results for the Red Dog Mine treatability studies used ferric chloride. Briefly explain how the starting dosage of 10 mg/l Fe was selected (e.g., how does this relate to stoichiometric amount?).

(6) Section 3.3: Briefly explain how the starting dosage of 500 mg/l S was selected. As proposed for iron co-precipitation testing, add a test series to determine the effectiveness of different sulfide dosages.

(7) Section 6: Since the treatability study reagents will be added as solutions, in evaluating the analytical data results, it is important to record the volume of solutions added to account for any dilution.

(8) Section 10: This document lacks specific procedures for testing and evaluation of ion exchange (Section 3.4 and 6.3) and QA/QC (Section 4). The schedule should indicate when these items will be added to the work plan.